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Marshall Space Flight Center



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Hybrid Holographic System

The problem:

Holograms are normally produced by either one of two methods: the reflection method or the direct method. The reflection method reflects the signal beam from the test object in a forward direction to the photographic plate. When a hologram taken by this method is reconstructed, the test object is displayed with excellent resolution, since it is illuminated from the front. However, this method has the disadvantage of requiring that both the test object and the holographic system be mechanically stable (essentially motionless). In the direct method, the laser beam is transmitted through or by the test object after having first passed through a diffuser plate positioned between the laser light source and the test object. The direct method has the advantage of partially relaxing the stringent requirements for mechanical stability but has the disadvantage of poor resolution of the test object's front surface detail, since the object is illuminated only from the back.

The solution:

An improved holographic system has been designed with a high degree of resolution and a capability of providing a hologram of a moving object, without requiring that the system have a high mechanical stability.

How it's done:

The holographic system accomplishes these objectives by employing three beams: two beams are modulated by the test object, one in the reflection method, the second

in the direct method. The third beam serves as a reference. The beams are oriented so as to cause both modulated beams to interfere with one another as well as with the reference beam. The beam paths are oriented with respect to the motion of the test object so that any change in beam-path length during the exposure time will not adversely affect the interference patterns between the beams. Additionally, the system's requirement is relaxed by using a light diffuser in the reflection path.

Note:

Requests for further information may be directed to:
Technology Utilization Officer
Marshall Space Flight Center
Code A&TS-TU
Huntsville, Alabama 35812
Reference TSP72-10260

Patent status:

This invention has been patented by NASA (U.S. Patent No. 3,535,014), and royalty-free license rights will be granted for its commercial development. Inquiries about obtaining a license should be addressed to:

Patent Counsel
Code A & TS-PAT
Marshall Space Flight Center
Huntsville, Alabama 35812

Source: Robert L. Kurtz and B. N. Norden
Marshall Space Flight Center
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